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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/909,993	07/23/2001	Susan Davis Allen	FSU-0003	1378

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EXAMINER

KORNAKOV, MICHAEL

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 10/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/909,993

Applicant(s)

ALLEN, SUSAN DAVIS

Examiner

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17-37 and 66 is/are pending in the application.
- 4a) Of the above claim(s) 4, 5, 7, 12, 13, 19 and 21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6, 8-11, 14, 15, 17, 18, 20, 22-37 and 66 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-15, 17-37 and 66 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.
2. Claims 1-15, 17-37, and 66 are currently pending. Claims 4, 5, 7, 12, 13, 19, 21 are withdrawn from consideration as being drawn to a non-elected invention. Claims 1-3, 6, 8-11, 14, 15, 17, 18, 20, 22-37, 66 are examined on the merits.

Drawings

3. Figures 1-6 apparently should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: with regard to Fig. 13 page 43 indicates particles with the reference 222 (line 17) and the same

particles are indicated with the reference 122 (line 19). Appropriate correction is required.

5. The specification is objected to as apparently failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o).

Claim 1 recites “**selecting laser energy transfer parameters** and a composition, thickness and geometry of an energy transfer medium **based on a composition of the one or more particle(s) to be removed**”, which, apparently, is not recited in the instant specification. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 1,2,3, 6, 8-11, 14,15, 17,18,20,22-32 33,34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 1 recites “selecting laser energy transfer parameters and a composition, thickness and geometry of an energy transfer medium based on a composition of the one or more particle(s) to be removed...”. However, the instant specification does not provide any guidance or details as to how to perform such step of selecting laser energy

transfer parameters based on a composition of the one or more particle(s) to be removed. Therefore, one skilled in the art would not be able to practice the instant invention without undue experimentation. Claims 2,3, 6, 8-11, 14,15, 17,18,20,22-32 are rejected because of their dependency.

Claim 33 recites "a composition, thickness and geometry of the energy transfer medium are selected based on a composition of the one or more particle(s) to be removed...". However, the instant specification does not provide any guidance or details as to how to perform such step of energy transfer medium selection based on a composition of the one or more particle(s) to be removed. Therefore, one skilled in the art would not be able to practice the instant invention without undue experimentation. Claim 34 is rejected because of its dependency.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 27, 28, 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 27,28,29 recite the limitation "energy transfer material". There is insufficient antecedent basis for this limitation in the claim.

10. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

11. Claims 1-3, 6, 8-11, 14,15,18,20,22-26,31,35,37,66 are rejected under 35 U.S.C. 102(b) as being anticipated by Tam et al (J. Appl. Phys., Vol. 71, No. 7, 1 April 1992).

Tam teaches laser cleaning techniques, utilized in semiconductor industry for the removal of sub-micron size particles from semiconductor surfaces. The teaching of Tam includes selecting an optical radiation source, such as KrF or YAG lasers, having an optical energy distribution; determining a composition (water or alcohol or their mixture) with defined thickness (a few microns, page 3519, left column) and geometry (a film, page 3519, left column) to serve as an energy transfer medium for said optical radiation source having said optical energy distribution; determining an optical pulse of said optical radiation source, while employing the said energy transfer medium and irradiating particles deposited on the sample surface by transferring energy from the optical radiation source through the energy transfer medium, thus dislodging the particles from the surface. Regarding the recitation of the instant claims, concerning with "minimizing damage to the sample", it is noticed here that Tam discusses the possible damage to the substrate and provides conditions to eliminate or minimize such damage. Regarding the limitation of claim 1, which is concerned with selecting laser energy transfer parameters base on a composition of the particle(s) to be removed, Tam teaches that the laser fluence is chosen depending on the types of contaminants to be removed and on the substrate damage threshold (page 3522, summary). Regarding the instant claim 6, Tam teaches the pulse length and shape of the laser pulse at page 3518 under heading 1 and illustrated in figures 3 and 4.

As to claim 3, 8, 9 and 10 disclosing that the laser energy transfer parameters comprise the wavelength of the laser energy figure 3 disclosing 248 nm and 10.6 micron wavelength; the density of the laser energy, the pulse length and shape of the laser energy, the pulse repetition rate of the laser energy, and the laser beam size and/or shape, and the irradiation geometry of the particle(s)/substrate/energy transfer medium are inherently present in the teaching of Tam. Since the values of size and shape of the beam are not currently elucidated, the beam of Tam will have a size and shape, and is disclosed to have a pulse repetition rate. Figure 4 and relevant associated text details the use of a Moly mask for the laser and various other beam property control elements. The temperature where the cleaning is performed is the ambient.

As to claims 14, Tam discloses experimenting with different solvents in order to ascertain the best result. Figure 3 illustrates different coupling scenarios.

Regarding the limitation of the instant claim 37, which is concerned with absorption of radiation pulse largely by energy transfer medium, but not significantly by the sample, Tam teaches the implementation of such cleaning technique in the abstract and by indicating the expectation that film-enhanced laser cleaning works the best when the laser wavelength is chosen for strongest absorption by the liquid film (page 3520).

Regarding the specificities of claim 66 see also Fig.3 and page 3518 et seq.

Regarding the claim 17, the processing parameters of Tam are selected based on a specific application (removal of sub-micron size particles from semiconductor surfaces) and implemented in a specific environment, wherein arrangement for liquid film enhanced pulsed laser cleaning equipment was accommodated.

12. Claims 28,29,33,34,36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tam et al (J. Appl. Phys., Vol. 71, No. 7, 1 April 1992).

Regarding the limitations of claims 28 and 29, Tam discloses depositing energy transfer medium onto the substrate (page 3519), however remains silent about specificities of depositing equipment, which are indicated in the instant claims 28 and 29. However, it is noticed here that if the operation is known in reference to the object or process, the invention of the new machine for performing it does not make a new process, but only a new instrument for applying it, *In re Terezy-Hornoch*, 158 USPQ 141 (CCPA 1968).

Regarding the specific limitations of claims 33,34,36, Tam remains silent about some particularities, disclosed in these claims, such particularities to include; selecting a composition, thickness and geometry of the energy transfer medium based on a composition of the particle(s) to be removed; determining an optical energy distribution of an optical radiation source based on the optical characteristics of a surface of a sample or particle(s) to be removed from the sample. However, Tam clearly motivates the skilled artisan to implement such particularities by indicating that some degree of empirical optimization of the liquid type to be used for laser cleaning of various substrates with various types of particles (page 3522, F). Tam also motivates the skilled artisan to consider the optical characteristics of a sample or particle(s) by discussing the optical characteristics of a solid surface, being very absorbent or opaque. Therefore, one skilled in the art motivated by the teaching of Tam would have found obvious to select a composition, thickness and geometry of the energy transfer medium based on

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a composition of the particle(s) to be removed and determining an optical energy distribution of an optical radiation source based on the optical characteristics of a surface of a sample or particle(s) to be removed from the sample in order to optimize and provide efficient cleaning conditions in the method of Tam.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M. Kornakov

Michael Kornakov
Primary Examiner
Art Unit 1746

10/27/2004